

RESPONSES TO OSHPD

Questions on the Fire and Life Safety Provisions

1. Application of a consistent code throughout the country is an important consideration. To date, what state and local jurisdictions have adopted the *NFPA 5000, Building Construction and Safety Code*?

A. NFPA 5000™, *Building Construction and Safety Code*™ is a recently-published document: issued in July 2002, published in September 2002, and available in October 2002. Even with its recent availability, NFPA 5000 is adopted in Pasadena, Texas. And many of NFPA 5000's key life safety provisions have been in use for years across the country. NFPA 5000 is substantially based on NFPA 101, *Life Safety Code*®, which was used as the base document in the drafting of NFPA 5000. The *Life Safety Code* has been extensively adopted at the state level (35 states adopt it in whole or in substantial part) and at the federal level (many federal agencies specifically adopt and enforce the *Life Safety Code*, including the Centers for Medicare and Medicaid Services, Department of Defense, General Services Administration, United States Postal Service, National Park Service, Department of Energy, National Air and Space Administration, etc).

California has long been the leading state in building regulatory advances, and is among the first considering adoption of NFPA 5000. Other states and jurisdictions are in the process of adopting or seriously considering adoption of NFPA 5000 as well, including the City of Phoenix and the State of New Mexico, among others. Also, it is important to note that while the number of model building codes has been reduced to two, the number of different state building codes remains at 50 because each state amends their adopted model code to suit their local needs.

2. What is the correct starting point or method for using *NFPA 5000* for building design and plan review? We have heard various methods presented, and many seem difficult to follow. Should designers and building officials:
 - Start in the occupancy chapters, and then proceed to the chapters for general requirements.
 - Start with the general chapters and move to the occupancy chapters, or
 - Proceed through the code from beginning to end?

A. As with the current California Building Code, there is no set process or path that always has to be followed. Recommended paths of use certainly depend on the purpose of the use.

Understanding the format of this occupancy-based code and the relationships between the different chapters is important for being able to successfully use the code. The format can be broken down as follows:

- Administrative (Chapters 1-5).
- Core Fire & Life Safety (Chapters 6-15).
- Occupancy (Chapters 16-34).
- Structural (Chapters 35-40).
- Materials (Chapters 41-48).
- Building Systems (Chapters 49-55).
- Annex Materials.

Administrative Chapters : Chapter 1 establishes the administrative provisions for the enforcing agency, including inspection and plan review provisions. Chapter 2 lists the standards that are referenced in various sections of the code. Chapter 3 catalogues the definitions utilized throughout the code. Chapter 4 primarily establishes the goals for the code, which are satisfied through enforcement of the prescriptive code. These goals are also necessary in determining equivalency of alternate designs, materials, and methods of construction. Chapter 5 establishes a methodology for determining equivalency for alternate designs, materials, and methods of construction, when alternates are employed.

Core Fire & Life Safety Chapters : Regulations in these chapters set forth the general fire and life safety requirements, such as types of construction, allowable heights/areas, fire resistive construction, means of egress, accessibility, etc. These requirements generally apply, unless specifically addressed in the occupancy chapters. Chapter 6, Classification of Occupancies, is instrumental in the use of the code because it establishes occupancy based on character or use of the facility.

Occupancy Chapters : Each occupancy is regulated by a specific chapter, which provides overall direction for regulation of that particular occupancy. Generally, applicability of the core fire and life safety chapters is established. Each occupancy chapter is formatted similarly and establishes:

- General requirements.
- Means of egress provisions.
- Protection (alarms, sprinklers, etc.) requirements.
- Building services regulations.
- Special occupancy provisions.
- Operating features requirements.

Structural Chapters : These provisions generally apply independent of the occupancy of the building. Chapter 35 provides the general structural design provisions and load requirements.

Materials Chapters : Each chapter addresses regulation of the specified structural material independent of the occupancy of the building.

Building Systems : Each chapter establishes regulations for the specified building system. Many are references to other *Comprehensive Consensus Codes*[™], such as the

National Electrical Code®, or the *Uniform Plumbing Code™* or *Uniform Mechanical Code™*.

For plan review and design, the approach outlined below is one example of how a designer or plan reviewer can effectively move thorough the requirements of the code.

1. Is this a new building or renovation/repair to an existing building? See Chapter 15 for regulations affecting existing buildings undergoing construction.
2. Establish if prescriptive-based approach will be used or performance-based approach will be used (Chapter 4).
3. Determine the occupancy classification of the structure. Select occupancy classification(s) and definitions that most accurately fit the use of the building (Chapter 6).
4. Review and check the detailed occupancy requirements for charging language for the fundamental requirements in the core fire and life safety chapters. Any modifications of the fundamental requirements, charging language requires compliance with some or all parts of the core chapters (Chapters 16-30).
5. Determine the actual physical properties of building:
 - (a) Determine the building area for each floor (Area definition - Chapter 3).
 - (b) Determine the grade elevation for building (Grade definition - Chapter 3).
 - (c) Determine the building height in feet above grade (Height definition – Chapter 3).
 - (d) Determine the building height in stories (Story definition – Chapter 3).
6. Determine the minimum type of construction necessary for the proposed occupancy by:
 - (a) Determining maximum allowable heights and floor areas based on Types of Construction and Occupancy Classification (Table 7.4.1).
 - (b) Check allowable height and area increases permitted (Chapter 7).
7. Check detailed construction requirements including, but not limited to:
 - (a) Fire protection of structural members (Chapter 7 and Table 7.2.2).
 - (b) Fire protection requirements (Chapter 8).
 - (c) Means of egress requirements (Chapter 11).
 - (d) Elevators (Chapter 54).
 - (e) Sprinklers, standpipes, and alarm systems (Chapter 55).
 - (f) Use of combustible materials - interior (Chapter 10).
 - (g) Roof coverings (Chapter 38).
 - (h) Light, ventilation (Chapters 49 and 50).

(i) Sanitation (Chapter 53).

8. Review structural design considerations and material provisions based on the type of material utilized.
9. Check other requirements as necessary.

These steps are naturally varied in sequence by individual preferences; however, the first three are standard steps that should be followed in proper order to assist in design or review of buildings.

3. *NFPA 5000* allows heights and areas that are much larger than what has historically been allowed in the UBC and CBC. What justification was provided to increase the allowable heights and areas so drastically?

A. For the first draft of NFPA 5000, the Structures & Construction Technical Committee formed a Task Group to deal directly with the contentious issue of allowable height and area requirements. Over the course of the code cycle, the Task Group reviewed a substantial number of resource documents on this topic. From this extensive review, the group concluded that traditional height and area requirements are based primarily upon experience and not scientifically derived. So the Task Group set out to develop a new approach, grounded in scientific principles, which was based upon the concept of fire compartments. This new approach was fleshed out and printed in the ROP draft.

However, by the time of the ROC, the Task Group concluded that there were still several unresolved issues surrounding this new approach for regulating allowable heights and areas, and it was simply not ready to be included in NFPA 5000. So at the ROC meeting, the Task Group recommended to the Structures & Construction Technical Committee that NFPA 5000 include an approach based upon heights and areas that are familiar to architects, engineers, and code officials. The numbers found in NFPA 5000 Table 7.4.1 reflect the current provisions in model building codes on the topic and include numbers that are consistent with other NFPA documents, including NFPA 101, *Life Safety Code*.

It is worth noting that the Technical Committee responsible for Chapter 7 is still committed to developing a new scientific approach to allowable height and area requirements based upon fire compartments.

4. Allowable heights and areas are much larger for ambulatory health care facilities than even the IBC allows (and far exceed the limits in the CBC). What justification is given for such large and tall buildings where patients are rendered incapable of self-preservation?

A. The heights and areas limitations for ambulatory health care (AHC) occupancies are nearly identical to those for business occupancies, with the exception of the height limitations for nonsprinklered buildings of the unprotected construction Type II (000),

Type III (200), and Type V (000). This is based on the premise that AHC occupants utilize a protection package that starts with the requirements for a business occupancy and then adds extra protection requirements, such as subdivision of building space via smoke barriers. The smoke barriers create smoke compartments that serve as refuge areas allowing patients to wait-out the emergency, be “revived” to ambulatory status, or otherwise prepared for evacuation by staff.

The number of patients rendered incapable of self-preservation in an ambulatory health care occupancy typically does not outnumber the staff available to help with patient movement. This approximate one-to-one ratio is not mandated by the code, but is provided for functional purposes. A patient who is administered general anesthesia is generally surrounded by an anesthesiologist, another specialist such as a surgeon, and one or more nurses. Recovery rooms have similar high staffing levels. Thus, the height and area limitations for AHC occupancies are justified in being nearly identical to those for business occupancies. Where AHC height limitations are stricter than those for business occupancies [that is, for nonsprinklered buildings of the unprotected construction Type II (000), Type III (200), and Type V (000)], there is a recognition that with non-rated floors, non-rated structural supports, and no sprinklers, the structural integrity of the building is not assured for the time needed to evacuate nonambulatory patients.

5. *NFPA 5000* offers substantial “trade-offs” in construction for automatic sprinkler systems. It is very likely that an earthquake may render such sprinkler systems inoperative in areas of high seismic activity. Additionally, sprinkler systems may be shut off for maintenance or service. How are buildings protected against fire, where sprinkler systems are used for trade-offs and then fail to operate when needed?

A. Over the past five years, the trend in all model building codes has been to allow reductions in some required protection features where automatic fire sprinklers are provided. Sprinkler systems provided for purposes of complying with the construction alternatives offered by *NFPA 5000* must be installed per *NFPA 13, Standard for the Installation of Sprinkler Systems*, which includes a host of seismic design and bracing requirements. In areas of high seismic activity, if a sprinkler system is subject to damage, other construction features such as fire barriers are also subject to damage. Likewise, earthquake damage does not immediately translate into a fire emergency or the need to evacuate.

Let’s use a hospital as an example. If sprinkler systems are damaged in an earthquake, hospital administrators might decide that the evacuation and relocation of patients to another facility is needed because the defend-in-place strategy that relied on sprinkler protection can no longer be assured to work. Similarly, if a fire barrier (for example, the smoke barrier that creates a minimum of two smoke compartments on each patient floor) is damaged by earthquake, hospital administrators might decide that the evacuation and relocation of patients to another facility is needed because the defend-in-place strategy that relied on fire/smoke barriers can no longer be assured to work.

On the subject of sprinkler systems being shut off, there are two issues: (1) inadvertent or unauthorized valve closure, and (2) maintenance or service shut downs.

Inadvertent or unauthorized shutoffs are addressed by the requirement that sprinkler systems must be supervised. Supervision, per NFPA 5000, must be electrical supervision so that appropriate notification is provided automatically any time a valve is closed. Such supervisory signals must sound and be displayed either at a location within the protected building that is constantly attended by qualified personnel or at an approved, remotely located receiving facility.

NFPA 5000 also addresses the issue of sprinkler systems being shut off for maintenance. For example, in the high-rise building provisions, 33.2.2.2 and 55.3.1.6 require that a sprinkler control valve be provided on each floor. This multiple valve arrangement permits for the sprinkler system to be shut off only on the floor where maintenance/service is to be performed while all other floors remain protected by sprinklers.

NFPA 5000 is part a coordinated set of codes and standards for the built environment. It relies on the adoption and enforcement of a fire prevention code such as NFPA 1, *Uniform Fire Code*TM. The fire code has additional requirements addressing the number of hours a sprinkler system can be out of service before a fire watch must be provided or the building must be evacuated.

6. The NFPA *Manual of Style* includes “reasonable” in the list of “possible unenforceable and vague terms,” which “shall not be used within the body of codes or standards” if the language is unenforceable or vague. In light of this requirement, and the fact that virtually all of Chapter 4 of *NFPA 5000* uses phrases such as a “reasonable level of safety,” “does not unreasonably affect...,” “provide reasonable assurance,” and “consistent with reasonable expectations,” how can a building official apply and enforce Chapter 4 of *NFPA 5000*?

A. Section 4.1 of NFPA 5000 establishes the goals and objectives for the prescriptive code. It is an integral and important part of the overall document, not only for the prescriptive code but also for the performance-based design options. Yet, Section 4.1 is not intended to be directly and independently enforced. In fact, compliance with the prescriptive requirements of the code satisfies the goals and objectives set forth in Section 4.1.

More specifically, the goals and objectives in NFPA 5000 serve as:

- (a) The bases for which the NFPA technical committees developed the prescriptive-based requirements of Chapter 1 through Chapter 4 and Chapter 6 through Chapter 55 of the code. The prescriptive requirements inherently reflect the goals and objectives of section 4.1. The vast majority of building projects will use the prescriptive option, so, again, Section 4.1 is not meant to be directly and independently enforced.

(b) The bases for which the NFPA technical committees developed the performance criteria of Section 5.2 for use with a performance-based design in accordance with Chapter 5. Performance-based designs will typically be used only for construction projects utilizing alternate design, materials, or methods of construction. The Authority Having Jurisdiction (AHJ) will typically rely on an approved, independent third party reviewer, as permitted by 5.1.3. So, once again, Section 4.1 is not meant to be directly and independently enforced.

7. What is the correct occupant load factor for assemblies?

- Section 16.1.6 states that occupant load is to be determined using the load factors in Table 11.3.1.2. This table provides different load factors for different uses, ranging from 3 sf per person to 100 sf per person. The next sentence in section 16.1.6 says that the occupant load shall not exceed one person in 5 sf in areas not in excess of 10,000 sf, and one person in 7 sf in areas in excess of 10,000 sf.
- At the NFPA presentation to the state agencies, when I asked how to apply these seemingly different requirements within the same code section, the presenter told the group that the different requirements give the designer more options in designing the building. Rather than options, this seems to add confusion and inconsistency.

A. Note that the first column of Table 11.3.1.2, Occupant Load Factor, is titled “Use” and not “Occupancy.” It is possible to have an assembly use that is not an assembly occupancy. For example, if a meeting room for approximately 20 persons is located in an office building (that is, in a business occupancy), the meeting room would be an assembly use and it would be part of the business occupancy. The occupant load of the meeting room would be calculated using either the 7 ft² or 15 ft² per person occupant load factor from Table 11.3.1.2. Because of the presence of tables and chairs, the 15 ft² per person factor for “less-concentrated assembly use” is chosen for use in calculating the occupant load.

Table 11.3.1.2 does not offer the 3 ft² per person occupant load factor for an assembly use. The table offers the range of 7 ft² through 100 ft² per person. The 3 ft² per person occupant load factor is for use only for a specialized form of waiting space in an assembly occupancy. The code user learns this, not from Table 11.3.1.2, but from going to the assembly chapter and reading 16.1.6.1. Further, by going to Chapter 16 for an assembly occupancy, the code user learns from 16.1.6 about the maximum packing densities via a set of 5 ft² and 7 ft² rules.

So, the intent of Table 11.3.1.2 is to provide the generalized occupant load factors for various uses; and the intent of 16.1.6 and 16.1.6.1 is to provide unique, specialized guidance on occupant loads in assembly occupancies. This is the typical format used in NFPA 5000 where the means of egress chapter (Chapter 11) provides the general egress information, and the occupancy chapters (for example, Chapter 16 for assembly) provide the specialized criteria and deviations from the general provisions.

In piecing together the generalized data in Table 11.3.1.2 and the specialized provisions of 16.1.6 and 16.1.6.1, the code user dealing with an assembly occupancy learns:

- (a) Use 7 ft² per person where furniture is almost nonexistent, such as for a stand-up reception or a dance floor; this is referred to as “concentrated use” in Table 11.3.1.2.
- (b) Use 15 ft² per person where there is furniture occupying part of the space, such as for a meeting room or dining area; this is referred to as “less-concentrated use” in Table 11.3.1.2.
- (c) Increases in occupant load are permitted over the number of persons calculated using 7 ft² and 15 ft² per person (see 11.3.1.3 through 11.3.1.3.2 and the second sentence of 16.1.6). Provided the area does not exceed 10,000 ft², patrons of the assembly occupancy are permitted to be “packed-in” at the rate of 1 person per 5 ft². In areas greater than 10,000 ft², the maximum packing density permitted is 1 person per 7 ft². This is because the patrons in the larger venue will tend to move toward the attraction (for example, toward the band on the stage at the front of the room). Such movement will leave the back of the room sparsely occupied and the front of the room more densely occupied, even though the average for the room is 7 ft² per person. In smaller venues, 5 ft² per person is permitted because the occupant loading density remains fairly constant throughout the room.
- (d) For specialized waiting spaces (for example, the space in a movie theater lobby where ticket holders are corralled by ropes supported on stanchion posts), the occupant load is permitted to be set at 1 person per 3 ft². The 3 ft² per person occupant load factor is not for use where patrons belly-up to the bar 3-deep waiting to be served a beverage.

The numerous provisions for occupant load calculations in assembly occupancies are necessary. It would be unfair to the venue operator to establish just one option such as 15 ft² per person when additional patrons can be safely accommodated. Similarly, it would be unfair to the AHJ if all assembly occupancies were permitted to pack patrons into an area at the rate of 1 person per 5 ft² when safety cannot be assured. Some facilities can safely accommodate patrons at 5 ft² per person and others cannot. The detailed criteria of 16.1.6 regulate the subject fairly.

8. What is the correct application of the height increase allowed for residential sprinklers in section 7.5.2? It is not clear if section 7.5.2 is an exception to section 7.4.1 (allowing an NFPA 13R system for residential occupancies instead of the NFPA 13 system required in 7.4.1), or if this is an additional increase to the sprinklered heights shown in Table 7.4.1 for any occupancy, or something else.

Also, depending on the type of construction, the maximum height in the table for non-sprinklered buildings exceeds the allowable heights in section 7.5.2 for residential buildings sprinklered with a 13R system (the allowable height for a non-sprinklered building exceeds the allowable height for a 13R sprinklered building). Not until one

looks at the specific application of NFPA 13R does one find that it can only be used in buildings not exceeding four stories in height. The four-story limit specified in section 7.5.2 is actually not a limitation of the residential occupancy, but rather of the 13R sprinkler system that may be used in the building.

A. NFPA 5000, Table 7.4.1, allows an increase in both the maximum building height and allowable number of stories above grade when a building is protected throughout with an approved, electronically supervised sprinkler system in accordance NFPA 13 (as specified in Section 55.3.1.1(1)).

In addition to these requirements in Table 7.4.1, Section 7.5.2 limits the user to a 20 ft increase in the overall height and a 1-story increase if a NFPA 13R system is substituted for a NFPA 13 system. Section 7.5.2 only allows a NFPA 13R system to be used if the overall building height does not exceed 60 ft and the maximum number of stories does not exceed four stories.

9. Does the area increase for sprinklers (section 7.6.2.2) apply to building areas in Table 7.4.1 where the occupancy is not permitted in non-sprinklered buildings?

A. NFPA 5000, Section 7.6.2.2, allows an increase in the allowable area per floor for sprinklered buildings. This option applies to any building that is protected by an approved, electrically supervised automatic sprinkler system installed in accordance with NFPA 13.

In the situation where a particular occupancy is required to be sprinklered, the designer is still permitted to utilize this automatic sprinkler increase for the building, unless it is specifically prohibited by the occupancy- or use-specific chapter (NFPA 5000, Chapters 16-34).

10. The NFPA *Manual of Style* requires that exceptions be worded as requirements whenever possible. Why has the exception format not been retained when the resulting text is awkward, confusing or contradictory? For example, section 19.1.1.4.1.2 states that “doors...shall normally be kept closed,” and section 19.1.1.4.1.3 states that “doors...shall be permitted to be held open if they meet the requirements of 19.2.2.2.7.” The two sections say opposite things, when one is actually an exception to the other.

A. NFPA staff has never encountered code text that cannot be effectively expressed in the form of requirements without the use of exceptions. There should never be a case where the “exception” format is needed. Rather, there is a big need for careful code wording so as to avoid apparent conflicts. The wording of 19.1.1.4.1.2 and 19.1.1.4.1.3, as questioned, is not contradictory, it is complimentary as an exception.

Differing formats is a matter of preference.

11. Does NFPA anticipate that the “weighted width” formula in the frontage increase calculation will be widely used? With the summation function, the formula will be virtually unusable by architects and building officials without extensive education and recent experience in higher math skills.

A. NFPA 5000, Section 7.6, allows the floor areas specified in Table 7.4.1 to be increased to account for frontage and automatic sprinkler protection. The equation for the frontage increase includes a variable, W_w , which contains a summation function, \sum .

Although this area increase is optional for the designer, this formula will be used in many cases to increase the building’s allowable area. It is anticipated that most architects and building officials are equipped with the education to utilize this algebraic equation. However, along with this code, it is anticipated that there will be tools, such as handbooks and computer programs, available to assist users in the proper application of this equation.

It may also be worth noting that the use of this algebraic symbol is a growing trend in codes and standards that deal with additive equations of varying length. For example, this summation function is utilized in many sections of the current California Building Code, including sections 1630.2.2, 1630.5, and 1910.11.4.2. Additionally, the summation symbol is used extensively in standards referenced by all model codes, such as ASCE 7-02.

12. Section 19.2.2.2.4(1) permits door locking arrangements if keys are carried by staff, with no limit to the number of locks in the egress path. 19.2.2.2.4(2) permits delayed-egress locks, but no more than one such device is permitted in the egress path. Why are any number of manual locks permitted, and only one delayed-egress lock, when delayed-egress locks have the added protection features of section 11.2.1.6.1?

A. Chapter 19, Health Care Occupancies, was written with full knowledge that staff is present in sufficient numbers, for day-to-day functional purposes, to assure that NFPA 5000 requirements that rely on staff assistance can be effectively relied upon as part of the overall protection package. Doors are permitted to be locked for the clinical needs of the patients. For example, to prevent Alzheimer’s patients from wandering away from their unit and encountering dangers such as falls down stairs or exposure to harsh outdoor weather conditions. Thus, the nursing staff is permitted to be responsible for unlocking multiple doors; staff does this while accompanying patients. Often such unlocking of doors is done to get to an adjacent smoke compartment as part of the defend-in-place concept employed. Contrast that with the delayed egress lock that will find its main application in portions of the building where there are fewer “locked-in” patients. Ambulatory patients, general staff, and visitors can be expected to encounter the delayed egress lock without having nursing staff at their side. Expecting someone without trained nursing staff at their side to be willing to wait multiple times for delayed egress locks to unlock is not reasonable.

13. Section 19.2.5.9 does not permit corridors to pass through any intervening rooms or spaces, other than corridors or lobbies. Section 19.3.6.1 permits many different rooms, areas and spaces to be open to the corridor. How does one reconcile these two sections?

A. The provisions of 19.2.5.9 address the same concept that 11.5.1.2 does, only 11.5.1.2 does it better because it states "...other than corridors, lobbies, and other spaces permitted to be open to the corridor." The concept is one of requiring access to an exit directly from the exit access corridor without having to enter some other use space. The thought is that there is no assurance of proper control over those other spaces, so having to pass through them does not assure safe egress. The health care technical committee will probably be in favor of modifying the wording of 19.2.5.9 to be identical to that in 11.5.1.2. The health care technical committee developed the wording of 19.2.5.9 long before the subject was addressed in the Chapter 11 egress provisions. The committee felt the language has been adequate historically because of the operative words "(not) pass through." Although 19.3.6.1 permits areas to be open to the corridor, egress cannot be through such areas. See, for example, 19.3.6.1(1)(d), 19.3.6.1(2)(c), and 19.3.6.1(5)(c), which all use the words "The area/space does not obstruct access to required exits," which is meant to require such spaces to be off to the side of the corridor.

14. Section 19.3.6.1(1) permits spaces of unlimited area and unspecified use to be open to the corridor. Apparently, the only limitations are that the spaces cannot be used for patient sleeping or treatment or hazardous areas, and they are protected with a smoke detection system. Does this permit a hospital without walls, except for patient sleeping and treatment rooms, hazardous areas and smoke barriers?

A. The space that is open to the corridor cannot be used for patient sleeping, treatment, or any use that creates a hazardous area (for example, storage, mechanical space, trash collection, soiled linen, laundries, laboratories). That leaves very few uses that would be compatible with running an effective health care occupancy. For example, although it would not be prohibited to place the accounting office in a space open to the corridor, functional needs dictate that the accounting department will not reside in spaces left open to a corridor within a patient sleeping unit. So, the question is purely academic; a hospital without walls (except for patient sleeping room walls, treatment room walls, hazardous area walls, and smoke barrier walls) just won't happen. The spaces permitted to be left open to the corridor will continue to be the traditional areas such as waiting spaces, solariums, and patient activity spaces.

15. Why is "Nonsprinklered Existing Building Rehabilitation" (Section 19.4.3) in chapter 19, and not in chapter 15? The use and application of Chapter 15, Building Rehabilitation, is extremely confusing.

16. The path to find information or requirements is often very confusing. Section 19.1.1.1.3 refers to chapter 15 for repairs, etc. Section 15.5.1.2.3, refers to section 15.6.2.5.2.3, which refers to section 19.1.1.4.3 for sprinkler requirements. Section 19.4.3.1 refers to projects exempted by section 15.5.1.2.3 from the sprinkler

requirements of section 19.1.1.4.3, which must comply with the requirements of sections 19.4.3.2 through 19.4.3.6, etc.

A -15 and 16. The requirements of Chapter 19, Health Care Occupancies, are predicated on the presence of a fully sprinklered building. Where rehabilitation projects are of a small enough magnitude to exempt the smoke compartment undergoing the rehabilitation from being sprinklered, it is important to steer the code user directly to subsection 19.4.3 without leading them to Chapter 15. Otherwise, the code user will attempt to use the requirements of 19.1 through 19.4.2 without modification, and that will lead to an inadequate level of protection for a nonsprinklered smoke compartment. The requirements of 19.4.3 introduce extras that are needed if there are no sprinklers, but not needed if sprinklers are installed. The wording in Chapter 15 serves as a cross reference so Chapters 19 and 15 do not conflict. It might be confusing at first, but in application it works and there are no conflicts.

There might be ways to simplify the roadmap of provisions for future editions of the code. The technical committees involved thought it was imperative that the first edition of NFPA 5000 offer the unique options presented by Chapter 15, Building Rehabilitation. The presence of Chapter 15 shows how the NFPA documents are state-of-the-art and responsive to user needs. Had Chapter 15 not been included in the 2003 edition, there would be no incentive for the adaptive reuse of existing buildings. Chapter 15 is offered for use with all occupancies. Health care occupancies are unique in that spaces are rehabilitated on an ongoing or never-ending basis.

Questions on the Structural Provisions

1. Describe the acceptance criteria used to select referenced publications for the code.
 - a. Are there standards for style and format?
 - b. What criteria are used to determine enforceability of the referenced publications?
 - c. Is the participation of enforcement agencies in the development of the referenced publications a consideration?
 - d. How are the issues of referenced publication cost, availability, and policies on updates and errata considered?

A -1a. and 1b. Acceptance and incorporation of referenced codes, standards, and other documents is strictly governed by the NFPA Regulation Governing Committee Projects (RGCP). Section 3-3.7, which is on page 52 of the 2003 NFPA Directory, establishes the criteria.

The documents that are referenced in the main body of the code: 1) must use mandatory language (see 3-3.7.1.1); 2) must typically be available for review at NFPA headquarters (see 3-3.7.1.1); 3) must be developed using an open process, which is generally, but not exclusively the American National Standards Institute (ANSI)-accredited process (see 3-

3.7.1.2); 4) may be allowed to not meet the criteria for open process when other choices are not available (see 3-3.7.1.3).

NFPA technical committees are charged with making the determination whether a particular referenced code or standard needs to be included in the document and complies with the RGCP. Design and construction criteria are so complex and broad today, that there is no way to capture all of the relevant information in a few sentences within a model building code. Generally speaking, NFPA technical committees would only reference other documents that were consistent with one or more of the stated goals and objectives in Chapter 4 of NFPA 5000. Since availability of the referenced document is a crucial concern in the NFPA process, NFPA technical committees almost always reference the edition of the document that will be available when the new NFPA code is issued.

A - 1c. Participation by a particular entity, such as code enforcement agencies, is desirable, but it is not a specific condition of review or acceptance for a referenced document. As noted in 1a and 1b, NFPA regulations stipulate a preference for referenced documents that are developed using an open process. It is important that no interests such as code enforcers be excluded from participating in the process of developing a referenced standard. In fact, the NFPA RGCP gives precedence to an open, voluntary consensus process, such as the ANSI-accredited processes, so that all interests have the opportunity for equal participation throughout the process. The category of “Regulators” is a standing interest category in the ANSI procedures.

A - 1d. All model codes use referenced standards, and all model codes indicate that the referenced standards are considered part of the model code. NFPA 5000 references 428 documents and NFPA 1 references 210 documents. The total number of references for the NFPA model building and fire codes is 638, which is considerably fewer than the number of referenced standards for the three ICC codes.

Specifically, the IBC references 518 documents, the IRC references 542 documents, and the IFC references 182 documents. Because adoption of the IBC also requires adoption of the IRC, the total number of references for the ICC codes is 1242. Agencies or jurisdictions using the ICC codes will have to purchase all of these documents from the ICC. And not only will jurisdictions have to purchase a building and fire code, but also a residential code and its referenced standards. This additional ICC code also forces jurisdictions to purchase additional training, certification, and resource material.

In order to be considered by NFPA for referencing, the NFPA technical committees make the following determinations:

- Does the document include information that is relevant to the subject at hand?
- Does it make the code better?
- Does it improve upon the level of safety?
- Does it provide guidance that will enhance building design and performance?

Since availability of the referenced document is a crucial concern in the NFPA process, technical committees reference the edition of the document that will be available when the next edition of the NFPA code is issued. The policy on updates to the referenced document is not a standing criteria. Technical committees will usually be made aware of the typical update to the document as a part of the review of the referenced standard.

2. Describe the methods used to review referenced publications cited in the structural chapters, prior to adoption into the code.
 - a. What process is used to evaluate and amend the referenced publications?
 - b. How many individuals review each publication?
 - c. How much time is allotted to the effort?
 - d. Is there a written public record of the findings and recommendations of the reviewers?

A - 2a. NFPA Regulations Governing Committee Projects, Section 4, clearly outlines the process of developing and revising documents. Within the context of this process, both the Structures and Construction Technical Committee and the Building Materials Technical Committee formed Task Groups for each of the structural and material chapters in order to recommend requirements to the technical committees on each specific topic. Parts of the Task Groups' work included reviewing and evaluating appropriate reference documents. For guidance in this particular area, the Task Groups turned to NFPA Regulations Governing Committee Projects, Section 3-3.7, which dictates the acceptance criteria for outside references codes, standards, and other documents.

In general, NFPA discourages technical committees from amending or revising the work of other ANSI committees. These specialized committees tend to have substantial expertise in a very narrow topic, and, as such, the NFPA 5000 technical committees, whose knowledge base is broader, need to respect this expertise. That said, however, the NFPA 5000 technical committees have the opportunity to amend the referenced document through the NFPA code development process. In addition, technical committees are encouraged to submit modifications correcting the problem to the document in question. As such, NFPA attempts to be directly involved in the development of other key referenced documents, or encourage those involved with other key documents to be involved in the development of the referencing NFPA code.

A - 2b. The Task Groups charged with reviewing each of the structural and material chapters varied in size considerably, from less than a handful to well over a dozen, depending upon the complexity of the topic. The individuals assigned to the Task Groups are recorded in the Technical Committee Meeting Minutes. Copies of the meeting minutes from the pre-ROP, ROP, and ROC meetings of both the Structures & Construction Technical Committee and the Building Materials Technical Committee are public record and available for your review.

Please keep in mind that each of the Task Groups presented their recommendations to the responsible technical committee. It was then the full technical committee that acted upon the Task Groups' recommendations. Those actions are recorded in the ROP and ROC.

A - 2c. Because this review took place within the confines of the NFPA 5000 code cycle, it was completed inside the standard 24 month cycle.

A - 2d. The meeting minutes cited in the answer to Question 2b are public record and contain summaries of the Task Group reports. In addition, the ROP and ROC, which are also part of public record, contain further public documentation of the process.

3. Identify and describe the duties of the individuals responsible for coordinating referenced publications.
 - a. How is the scope of the referenced publications (as applied in the code) determined?
 - b. What is the process for identifying and remedying conflicts?
 - c. How many individuals review the referenced publications for potential conflicts?
 - d. What are the criteria used to judge compatibility of the referenced publications with other structural requirements of the code?

A - 3a. NFPA technical committees have a wide realm of responsibility for determining what is and is not appropriate to reference in the code. The technical committees establish what is relevant to the code requirement. In some cases, the technical committees utilize task groups to review and recommend referenced documents and their applicability within the main code. In addition to verifying that it meets the criteria of the NFPA regulations, the technical committees must judge if the referenced document is technically consistent with the goals and objectives of the code (See NFPA 5000: Chapter 4).

A - 3b. NFPA 5000 Sections 1.3.2 and 6.4.1.2 delineate the authority for precedence. Any conflicts between the code and referenced documents default to the requirements of the code. NFPA technical committees are composed of technical experts who are normally intimately aware of the requirements of the referenced documents. Differences between the referenced document and NFPA 5000 are usually identified and the technical committee will then decide on how to proceed. That is, whether to knowingly move forward with a difference, to adjust the criteria in NFPA 5000 so as not to conflict (if possible) with the referenced document, or to develop an appropriate revision to the companion referenced document to be submitted to the companion document's development committees for consideration during its next code development cycle.

A - 3c. Besides task groups that may review the referenced document, the technical committee has responsibility for reviewing the recommendation from the task group to make a formal recommendation. In the NFPA Building Code project, a technical correlating committee also reviews the work of the 16 technical committees. All told,

there are approximately 50 to 60 members of task groups, technical committees, and the technical correlating committee who have an opportunity to review the selection of the referenced publications. Additionally, many other people participate in the development process. They, too, have the opportunity to review the document and comment.

A - 3d. Once again, the task groups, technical committees, and the technical correlating committee review, recommend, and judge compatibility of referenced standards with the provisions of the code.

From a structural point of view, the national trend is the development of a system that revolves around the National Earthquake Hazard Reduction Program (NEHRP). The expert or parent document for structural design that complies with this national program is ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, 2002. NFPA committees elected to take the approach that ASCE-7 should be used as the basis for all structural design issues. Amendments to ASCE-7 were determined to be not in the best interest of codes, authorities having jurisdiction, or of designers, as many conflicts would be created. In addition, ASCE-7 is largely coordinated with many of the material standards (ACI, AF&PA, and AISI) as well as with criteria from FEMA. The NFPA technical committees referenced ASCE-7 without amendment, thus bringing to bear a set of coordinated structural requirements from another ANSI-accredited organization.

4. Reference publications produced by the steel, concrete, masonry, and timber industries are valuable resources. However, they also reflect the bias of the industry group, and may include structural systems or methods of construction suitable only for areas of low seismic risk. What processes are used to screen the referenced publications to ensure systems of low ductility are not constructed in regions of high seismic risk?

A. The same process outlined in the answer to Question 2 of this section would be utilized to screen the referenced publications to ensure systems of low ductility are not constructed in regions of high seismic risk.

5. *NFPA 5000* contains numerous references to guidelines and handbooks. These documents may not be written in enforceable language, and often contain information that may be in direct conflict with other reference standards, yet they are accorded the full weight of code language, since Section 2.1 states that the documents or portions thereof referenced within the code shall be considered part of the requirements of the code. When conflicts arise, how would a Building Official determine what language takes precedence?

A. As indicated in the answer to question 3b, NFPA 5000, Sections 1.3.2 and 6.4.1.2, delineate the authority for precedence. Any conflicts between the code and referenced documents default to the requirements of the code. NFPA technical committees are composed of technical experts who are normally intimately aware of the requirements of the referenced documents. Differences between the referenced document and NFPA

5000 are usually identified and the NFPA technical committees will then decide on how to proceed. That is, whether to knowingly move forward with a difference, to adjust the criteria in NFPA 5000 so as not to conflict (if possible) with the referenced document, or to develop an appropriate revision to the companion referenced document to be submitted to the companion document's development committees for consideration during its next code development cycle.

6. If a referenced publication in turn references other documents, are these documents also considered to be a part of the building code? If not how is the referenced publication to be enforced?
 - *NFPA 5000* sometimes references different editions of material standards than those in ASCE 7-02. For example, NFPA 5000 references ACI 530-02 for masonry design, while ASCE 7-02 is based on ACI 530-99. Similarly, *NFPA 5000* references AISC Seismic Provisions for Structural Steel Buildings 2002, while ASCE 7-02 is based on AISC Seismic 97, with Supplement 2. Where there are technical differences, which edition of the material reference is enforced? If a version of a standard different from that specified in ASCE 7-02 is enforced, what steps have been taken to ensure that compatibility in design assumptions between ASCE 7 and the material standard is maintained?

A. In general, secondary and tertiary references in the referenced documents are not considered to be a part of the NFPA code, thus do not need to comply with the NFPA Rules Governing Committee Projects. It is really a decision of the jurisdiction as to how far they may want to drill down into secondary and tertiary referenced publications. NFPA 5000: 2.1 states “The documents or portions thereof listed in this chapter are referenced within this Code and shall be considered part of the requirements of this document.” It does not carry that responsibility out to the documents referenced within the referenced publications. There are situations, however, that common sense and logic will dictate that use of a secondary reference is necessary. For example, NFPA 5000 requires the use of sprinkler systems that comply with NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2002 edition. A sprinkler system with an adequate volume of water, but inadequate pressure, would need to have a fire pump included as a part of the design package. NFPA 13: 15.2.2 permits fire pumps installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* to serve as an acceptable source of water. NFPA 20 is not referenced in NFPA 5000, but logic would dictate that it is the best method to regulate the design of the pump system. Such criteria, however, is best called out in the construction plans and specifications that are submitted for review.

A - Sub-bullet. In certain cases, NFPA 5000 references different editions of material standards than those found within ASCE 7-02, Section 9.0, *Earthquake Loads*. For example, NFPA 5000 references ACI 530-02 for masonry design, while ASCE 7-02, Section 9.11 references ACI 530-99 for the design, construction and quality assurance for masonry components that resist seismic forces. In addition, Appendix A.9.11 of ASCE-7

provides supplementary provisions for the seismic compatibility between ASCE 7-02 requirements and those of ACI 530-99.

This is an example of lag timing of the various code development processes involved. ACI had not finished processing ACI 530-02 in time to make the appropriate modifications in ASCE 7-02. However, ACI had finished processing ACI 530-02 in time to be referenced in NFPA 5000.

It is certainly in California's best interests to adopt and enforce the most up-to-date codes and standards available. Consequently, as part of the review process, California will want to compare the seismic provisions of ACI 530-99 with ASCE 7-02's modifications to those of ACI 530-02 to determine if there are conflicts and how best to deal with those conflicts.

This issue is not unique to NFPA, but also finds its way into the other model building code documents, past and present.

7. How are structural elements and systems that bridge several different referenced publications handled? Which publication takes precedence?

A. As with any model code, there are structural elements and systems that bridge several different reference publications. Take, for example, the seismic requirements for composite construction found in Section 44.2.4 of NFPA 5000. In this section alone, four reference documents are called out – ACI 318, AISC LRFD, ASCE 7 and AISC Seismic, Part II. When necessary, the code language indicates which publication takes precedence. For instance, Section 44.2.4.2 indicates that the ASCE 7 *R* factor can be used when the structure is designed and detailed in accordance with the provisions of AISC Seismic, Part II.

8. How are the performance-based design options outlined in chapter 5 to be translated into enforceable design requirements? For example, Section 5.2.3.2 Serviceability Performance states "...structures shall not experience permanent deformation or deflection that is troubling to occupants or disruptive to building contents..." What criteria would be used to determine compliance with this requirement?

A. All model building codes, including NFPA 5000, have allowances for the use of alternative materials and methods of construction. But only NFPA 5000 establishes clear, concise goals and performance-based design provisions within the model building code for when this design option is utilized. The goals and objectives established in chapter 4 and the performance-based design provisions in chapter 5 establish a methodology for building owners, designers, and enforcers to utilize in order to establish equivalencies for compliance. No other building code integrates this level of support to the use of alternate materials or methods of construction.

The complexity and sheer amount of design, modeling, and documentation-preparation time associated with a performance-based design will severely limit the use of the

performance-based options to unique projects. As with any alternate design, material, or method of construction utilized under the existing California Building Code, stakeholders (which include the code enforcer) are expected to begin working together at the project inception stage with the task of determining equivalency. The burden is placed on the design team to translate the performance criteria into measurable design elements. NFPA 5000 provides the methodology for determining equivalency.

9. Describe the services that NFPA currently provides to enforcement agencies for code support.
 - a. Does NFPA provide interpretation services for questions on the referenced publications?
 - b. Does NFPA currently provide product evaluation services?
 - c. Does NFPA currently provide certification programs for inspectors, special inspectors, and plan reviewers? If so, please identify each type of testing and certification program.

A - 9a. NFPA has provided interpretation advisory services for many decades. In fact, NFPA responds to more than 30,000 interpretation requests each year. NFPA has a diverse technical staff of 120 professionals from appropriate disciplines to provide advisory services. NFPA's staff is composed of the following professions: Architecture, Building Officials, Chemical Engineering, Electrical Engineering, Engineering Physics, Fire Officials, Fire Protection Engineering, Mechanical Engineering, and Structural Engineering.

NFPA provides interpretation advisory services to NFPA members and to jurisdictional representatives at no charge. As an enforcing agency, OSHPD staff would receive the benefits of this service at no charge, regardless of membership status with NFPA. Instructions for taking advantage of this service are found on NFPA's Web site. Interpretation assistance may be in the form of telephone calls, e-mail, or letters. While NFPA staff strives to answer these requests immediately, verbal interpretations will be handled within one to two business days and written responses are handled within 5 to 10 business days.

Formal interpretations (see pages 60-61 of the 2003 NFPA Directory) are actually processed by our Technical Committees and can take three months since the responses are letter balloted by the Technical Committee members. If a formal interpretation is requested, it must be submitted on a form, which is available online. Formal interpretations are then processed through the appropriate NFPA Technical Committee, and once finalized are published and available as part of a subscription service.

This interpretation advisory service applies to the building code and also to questions on sprinklers, electrical systems, fire alarm systems, hazardous materials, or any of the subjects noted in the NFPA referenced documents listed in Chapter 2 of NFPA 5000.

NFPA will provide interpretation advisory service regarding referenced documents not promulgated by NFPA relating to applicability within the NFPA code. Though

discussion may occur regarding the technical details of a referenced document not promulgated by NFPA, the requestor will be advised to seek interpretation assistance from the promulgating organization.

NFPA also provides answers to Frequently Asked Questions about the codes on the NFPA Web site. These FAQ's are available free of charge.

NFPA will be issuing the first edition of the NFPA 5000 Handbook in November of 2003. This handbook will give added examples and cite some of the background information for application of the various code requirements. Other reference materials also are under consideration.

A - 9.b. NFPA is in the process of finalizing a partnership with IAPMO for the creation and operation of a product evaluation service to assess the ability of technologies and products to meet requirements included in NFPA 5000. IAPMO Research and Testing and IAPMO Testing and Services have been a major source for independent testing, research, and technical services for a wide variety of construction related products. IAPMO reports are utilized in dealings with jurisdictions including the City of Los Angeles, California Energy Commission, and others.

A - 9.c. NFPA currently provides a number of certification programs, including: Fire Inspector I, Fire Inspector II, Fire Plans Examiner, Certified Fire Protection Specialist, Certified Building Inspector, and Certified Building Plans Examiner. NFPA is currently in the process of developing a Certified Building Official program, as well as a Residential Electrical Inspector, and Master Electrical Inspector program.

NFPA allows transfers into these programs for persons currently certified under other reputable certification programs. This allowance is intended to give credit to the work already completed in an existing program. Doing so allows renewal into the NFPA certification program without the need of retaking the examination.

In general, the testing programs for these certification programs include a four-hour, open-book exam that consists of approximately 100 multiple-choice questions. The exam asks participants to recall specific information, apply knowledge to new or changing situations, and analyze facts to determine solutions.

Recertification is required every three years, and applicants must submit documented evidence of a total of 50 – 60 (depending on the program) professional development credit points from the following categories:

- Training
- Instruction
- Professional practice
- Publications
- Membership in professional organizations

The U.S. Department of Veterans Affairs has approved the CFPS, CFI, and CFPE Certification Programs for reimbursement of examination fees.

Additionally, NFPA develops and promulgates standards for professional qualifications that are recognized by many other organizations. These professional qualifications standards include firefighter qualifications, fire inspector, and electrical inspector qualifications.

10. Please provide a list of referenced publications that may be required in order to plan review an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

A. If such a facility is to be eligible for Medicare and Medicaid funding, it must comply with the provisions of the NFPA 101, *Life Safety Code* as required by federal law. Though NFPA 101 is not specifically adopted and enforced by the State of California, it is a reality for acute care hospitals, skilled nursing facilities, licensed clinics, and correctional treatment centers located throughout the state. NFPA 5000 is the only model building code that is closely correlated with NFPA 101. Adoption of NFPA 5000 offers such California facilities not only the possibility for fewer conflicts between NFPA 101 and the next California Building Code, but also considerable cost savings for the facilities.

The vast majority of the non-NFPA publications listed in Section 2.3 will not be needed for plan review purposes. Exceptions might include documents such as:

- (a) ACI 318, *Building Code Requirements for Structural Concrete*
- (b) ACI 530/ASCE 5/TMS402, *Building Code Requirements for Masonry Structures*
- (c) AF&PA ASC & LRFD
- (d) AISC ASD & LRFD
- (e) AISC Seismic, *Seismic Provisions for Structural Steel Buildings*
- (f) AISI-NASPEC, *North American Specification for the Design of Cold-Formed Steel Structural Members*
- (g) ASCE 3, *Standard for the Structural Design of Composite Slabs*
- (h) ASCE 7, *Minimum Design Loads for Buildings and Other Structures*
- (i) ASCE 8, *Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members*
- (j) ASCE 19, *Structural Applications of Steel Cables for Buildings*
- (k) ASCE 24, *Flood Resistant Design and Construction*
- (l) ASHRAE 62, *Ventilation for Acceptable Indoor Air Quality*
- (m) ASHRAE 90.1, *Energy Standard for Buildings Except Low Rise Residential Buildings*
- (n) ASHRAE 90.2, *Energy-Efficient Design of Low-Rise Residential Buildings*
- (o) ASME A17.1, *Safety Code for Elevators and Escalators*
- (p) ICC/ANSI A117.1, *American National Standard for Accessible and Usable Buildings and Facilities*
- (q) SJI, *Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders*

- (r) *Uniform Mechanical Code*
- (s) *Uniform Plumbing Code*

It is important to note that these standards are also referenced in the IBC and must be used with that document, since they are also considered part of that building code.

NFPA has not calculated the cost of these other standards. However, NFPA offers free training and associated code books to support statewide adoption of its building code. Since NFPA 5000 also references other NFPA codes and standards, those major NFPA standards will be made available free of charge to code enforcers who attend NFPA's complimentary training sessions.

11. Please provide a list of referenced publications that may be required in order to field review construction of an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

A. Field reviewers are expected to have the rudimentary skills outlined for plan reviewers in item 10 above. NFPA 5000, the referenced NFPA codes and standards, and ICC/ANSI A117.1 should suffice for field review. The NFPA documents will be provided free of charge to code enforcers who attend the free training sessions offered by NFPA to support statewide adoption of NFPA 5000, as indicated above. A copy of ICC/ANSI A117.1 is currently \$25.